

Revision of the Genus *Pandanus* Stickman

Part 1. Key to the Sections

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FOR THIRTY YEARS the writer has lived and has made plant collections on the tropical Pacific islands, the home of a great part of the genus *Pandanus* (Pandanaceae). His gatherings of the genus are numerous.

In 1955 and 1957 grants were received from the National Science Foundation of the United States, to make possible extensive exploration for this genus in the Pacific, for the employment of an assistant, and for research investigations. Most of the species are trees with elongate, saw-toothed blades, and large, fleshy fruits that are difficult to dry. Many of them have unpleasantly spiny trunks, branches, and even roots. Consequently, the collecting of specimens is difficult or hazardous, and the drying of them is a long and burdensome process. But few of the botanical explorers in the Pacific have had the interest or the endurance to make extensive collections of *Pandanus*. Most of the others, when collecting their first specimen, have been lacerated by the saw-like leaves or wounded by the spines of the trunk. They have then uttered an oath and sworn never to collect another *Pandanus*. As a result the *Pandanus* population has been well sampled in only a few areas.

Outstanding among previous explorers was Prof. Ryozo Kanehira of Kyushu University, who revealed much of the wealth of *Pandanus* in the Caroline Is., Marshall Is., and New Guinea.

Since 1955 the writer or his assistant, Benjamin C. Stone, have made lone explorations for *Pandanus* in the Ryukyu Is., Marianas Is., Caroline Is., Marshall Is., New Guinea, Bismarck Arch., Solomon Is., the New Hebrides, and the Hawaiian Is. In almost every one of these islands or archipelagos were discovered from two to five times as many kinds of *Pandanus* plants as were known there from earlier explorations.

The writer envisions that his published studies will form a revision of the genus, or at least of its species occurring in the Pacific. As small portions of it are finished, they will be published as numbered parts, with a consecutive paging, under one general title. In this way the finished parts can be made available early.

Many of the present sections of the genus are those groups recognized as genera by Gaudichaud. When only a few species were known, many of these groups seemed truly good genera. With the increase in the number of species to nearly 600, the "generic" distinctions have diminished or vanished. Hence, the writer concurs with the judgement of nearly all recent investigators that *Pandanus* is one very large genus that contains numerous well-marked sections. There is nothing to be gained by classing them all as subgenera, so the writer follows Warburg (1900) in dividing the genus into sections. More sections have been added recently, especially by E. G. R. Pichi-Sermolli (1951) in his study of the species of Madagascar.

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KEY TO THE SECTIONS

- A. Drupes all or mostly 1-celled (subgenus *Lophostigma*),
 - B. Stigmas broader than long, flat,
 - C. Stigmas flush, horseshoe-shaped, glabrous; drupes ellipsoid; syncarps solitary, spicate, or racemose; stamens umbellate at apex of column.....*Microstigma*
 - C. Stigmas raised; drupes cuneiform or fusiform,
 - D. Stigmas as broad as or broader than apex of drupe,
 - E. Stigmas oblate capitate, emarginate, as broad as the narrow apex of the fusiform drupe, in anthesis hirsute; heads single; staminate flowers unknown....*Pulvinistigma*
 - E. Stigmas discoid suborbicular, entire or lobed, broader than the cuneiform drupes, glabrous, imbricate and concealing the drupes; staminate flowers unknown.....*Asterostigma*
 - D. Stigmas narrower than apex of drupe, lunate, lateral under a horizontal, coriaceous, entire or lobed visor borne asymmetrically on the apical region of the drupe but not marginal; staminate flowers unknown.....*Maysops*
 - B. Stigmas longer than broad or orbicular,
 - F. Stigma 1 (rarely 2), setiform, at maturity deciduous from the pileus; staminate flowers unknown.....*Rykiella*
 - F. Stigmas broader than setiform, persistent,
 - G. Stigmas erect, crested and laterally expanded; staminate flowers unknown.....*Cristata*
 - G. Stigmas not crested,
 - H. Style subulate, apical, erect or ascending, bearing a distal stigma; stamens attached to axis, the column lacking.....*Acrostigma*
 - H. Stigmas broader than subulate,
 - I. Stigma on lateral edge of pileus, and horizontal, toothlike, entire; stamens crowded on conical apex of column.....*Lophostigma*
 - I. Stigma terminal,
 - J. Stigma a flat flap, entire or lobed, often orbicular or reniform, ascending or spreading; stamens umbellate on adaxial side of column apex.....*Microstigma*
 - J. Styles 1 (–2), toothlike to broad subulate, hornlike, cartilaginous, erect or spreading, bearing a proximal stigma; stamens fascicled at apex of column.....*Rykia*
 - A. Drupes or phalanges all or mostly several-celled (subgenus *Pandanus*),
 - K. Marginal carpels the smaller, acerose toothlike, mostly sterile; phalanges 5–10-celled; stamens few, on dichotomous apex of column.....*Stephanostigma*
 - K. Marginal carpels not toothlike and sterile,
 - L. Stigmas elongate, acerose,
 - M. Stigmas acerose, mostly forked; stamens umbellate on capitate apex of column.....*Multispina*
 - M. Stigmas of simple, acerose spines; staminal column bifid with digitate filaments that are simple or 2- 3-forked.....*Acanthostyla*
 - L. Stigmas not acerose elongate,
 - N. Stigmas apical and oblique or erect (or a small percentage of them horizontal),
 - O. Carpels in 1 transverse line or in several parallel such lines; stamens borne under a peltate apex of the column, or in several racemes with subtending bracts.....*Hombronia*
 - O. Carpels in circular, centripetal, or irregular arrangement, not a linear one,

- P. Other stigmas all facing a single marginal one or facing the marginal ones along one side; staminate flowers unknown.....*Lateriobtus*
- P. Stigmas centripetal; stamens subfasciculate or racemose.....*Pandanus*
- N. Stigmas flush, not ascending or oblique,
- Q. Stigmas apical,
- R. Phalange with a fibrous septum between the 2 cells; stigmas approximate; stamens umbellate on the capitate apex of the column, and with abortive gynoeceium*Martillidendron*
- R. Phalange of several (or 1) cells, each with a bony endocarp,
- S. Phalange not lobed, the summit broad convex,
- T. Stigmas 2-7, all (or all but one central one) centripetal, and on the margin of an apical ring or polygon; stamens unknown.....*Dauphinensia*
- T. Stigmas 1-9, centripetal, approximate in central area of broad, low convex apex; staminate column fasciate, bearing short terminal, free filaments, or filaments united 1/6-1/2 way in groups.....*Virsonia*
- S. Phalange apex lobed,
- U. Phalange apex broad convex or narrow, shallowly lobed between the 2-9 stigmas*Vinsonia*
- U. Phalange much narrowed to truncate (or concave) apex where the numerous carpel tips are crowded,
- V. Carpel apices low conic or low pyramidal, crowded; staminal column $\pm$ diffusely branched into short filaments shorter than the anthers*Mammillarisia*
- V. Carpel apices narrow deltoid or slender conic, the outer ones inflexed and very asymmetric; stamens unknown.....*Australibrassia*
- Q. Stigmas markedly subapical,
- W. Stigma on distal surface of carpel tip; staminate flowers unknown.....*Coronata*
- W. Stigma on proximal surface of carpel tip; staminate flowers unknown.....*Intraobtus*

SYNOPSIS OF SECTIONS

SUBGENUS *Lophostigma*, subgen. nov.

Carpellae drupas distinctas formant. Carpels distinct, in fruit forming drupes.

HOLOTYPE: section *Lophostigma* (Brongn.) Warb., in Engler's Pflanzenreich IV, fam. 9: 71, 1900.

There has been effectively published the subgeneric name *Acrostigma* by Martelli, Soc. Tosc. Sci. Nat., Atti, Proc. Verb. 42: 56, 1933. However, this name was printed without a description or a reference to one. This taxon "sottogenere" was not formally accepted by its author, Martelli, and he used it indiscriminately with "sezione," but the latter taxon, the section, was the one he actually accepted.

The sections in this subgenus follow in alphabetical order:

Acrostigma Kurz, Jour. Bot. Brit. and For.

5: 100, 1867; As. Soc. Bengal, Jour. 38(2): 146, 1869. Lectotype: *P. affinis* Kurz, Jour. Bot. Brit. and For. 5: 101, 1867. The section contains 51 species, and it occurs in: western Africa (1 species), India (15), Ceylon (3), Burma (1), Malaya (15), Thailand (2), Indochina (3), Philippines (5), Indonesia (23), New Guinea (14), Bismarck Arch. (1), Australia (2), and Fiji (1).

Asterostigma Martelli, Webbia 4(2): 427, 1914. Lectotype: *P. discostigma* Martelli, Webbia 4(2): 427, pl. 39, figs. 12-15, 1914, Borneo. The one other species, *P. stelliger* Ridl., is from Malaya.

Cristata Martelli, Philipp. Jour. Sci. Bot. 3C: 70, 1908. Type: *P. Cumingianus* Martelli, from Negros, P. I., the only species.

Foullioya (Balf. f.) Warb., emend. Pic-Ser., Engler's Pflanzenreich IV, 9: 44, 73-74, 1900

(as *Fouilloya*); and Inst. Sci. Madagascar, Mém. sér. B, 3(1): 97–100, 1951. The genus *Foullioya* Gaud., Bot. Voy. La Bonite, Atlas, pl. 26, figs. 1–9, 21–24, (1843) [= 1841] was without description and contained two species, hence was invalid. The earlier spellings of the generic and sectional name were all *Fouilloya*, except for that by Kurz in 1869, and Pichi-Sermolli (1951: 100), who, after biographical investigation, corrected the spelling to *Foullioya*. He found no man named Fouilloy, but did learn of an associate of Gaudichaud's, the surgeon Foullioy, who served on a French naval expedition to Madagascar. From these facts, the correction in spelling by Pichi-Sermolli seems reasonable and permissible. The section contains five or six species from Madagascar.

Lophostigma (Brongn.) Warb., in Engler's Pflanzenreich IV, 9: 44, 71, 1900; genus *Bryantia*, section *Lophostigma* Brongn., Ann. Sci. Nat. Bot. VI, 1: 287, 1875. Lectotype: *Bryantia viscida* Brongn. = *Pandanus viscida* (Brongn.) Solms, of New Caledonia. The section contains five species: New Caledonia (4), and Fiji (1).

Maysops, sect. nov. Drupis 1-carpellatis fusiformibus vel suboblongis, stigmatibus lunatis sub margine petaso horizontale coriaceo integro vel lobato in apice sed asymmetrico, syncarpiis cylindraceis obtusis in bracteis naviculatis coloratis multis toto amplexis, drupis luteis aurantiacis vel subroseis eis apicalibus praematuris.

Drupes one-celled, fusiform to somewhat oblong; stigmas lunate, lateral under a horizontal, coriaceous, entire or lobed visor borne asymmetrically on the apical region of the drupe but not lateral; syncarps cylindric, obtuse, completely enwrapped in many boat-shaped, colored bracts; drupes yellow, orange, or pink, ripening serially, the apical ones first and shedding in this order.

HOLOTYPE: *P. Zea* St. John, from Queensland, Australia, described in this paper. Other species are: from the Solomon Is., *P. lamprocephalus*; from New Guinea, *P. cernuifolius*, *P. floribundus*, *P. Kivi*, *P. Krauelianus*, *P. microdontus*, *P. xanthocarpus*; from Amboina, *P. amboinensis*; and the writer has four more undescribed species from New Guinea. Other species that have the fruit and stigmatic characters, but have ovoid syncarps and lack the

numerous sheathing, colored bracts, are: *P. Joskei* of Fiji; *P. aggregatus* and *P. Archboldianus* of New Guinea; and *P. Beccarii* of the Aru Is. These should probably be included in this section, though they lack some of the characters.

The sectional name is formed from the epithet *Mays* of *Zea Mays*, plus the Greek *ops*, appearance, because of the striking resemblance of the fruit of these species of *Pandanus* to an ear of corn or maize in its husk.

Microstigma Kurz, Jour. Bot. Brit. and For. 5: 104–105, 1867. Lectotype: *P. ceramicus* Rumph., Herb. Amb. 4: 149, pl. 79, 1743 = *P. conoideus* Lam., Encyc. Méth. Bot. 1: 372, 1783. *Bryantia* (Webb in Gaud.) Warb. in Engler's Pflanzenreich IV, 9: 68, 1900, was based on the genus *Bryantia* Webb in Gaud., Bot. Voy. La Bonite, Atlas, pl. 20, (1843) [= 1841], published without description, but monotypic and with a figure showing details. Its holotype was *B. butyrophora* Webb in Gaud. = *P. conoideus* Lam. (1783). Here, also reduced to synonymy, is the section *Sussea* Warb., Engler's Pflanzenreich IV, 9: 44, 62, 1900, since its alleged characters do not hold and no new dependable differences have been found. Lectotype: *Sussea conoidea* Gaud., Bot. Voy. La Bonite, Atlas, pl. 24, figs. 1–12, 1841 = *P. montanus* Bory. The enlarged section now contains 98 species, and occurs in: west Africa (8 species), east Africa (3), Madagascar (20), Seychelles (1), Reunion (1), Mauritius (4), India (1), Burma (1), Malaya (2), Philippines (19), Indonesia (10), New Guinea (17), Admiralty Is. (1), Bismarck Arch. (5), Solomon Is. (6), D'Entrecasteaux Is. (1), and the New Hebrides (1).

Pulvinistigma Martelli (as *Pulvistigma*) emend. Kanehira, Univ. Calif. Publ. Bot. 12 (12): 369–370, pl. 48, 1930. Type: *P. Durio* Martelli. The emendation by Kanehira was published in the Jap. Jour. Bot. 14: 435, 1938. He pointed out that as Martelli had said (1930: 370), "The stigmas are thickly covered with short hairs that form a small cushion." The name *Pulvistigma* would seem to have been derived from the Latin *pulvis*, but this means dust, and is inappropriate. On the other hand, the Latin word *pulvinus* means a cushion, and this exactly

describes the distinctive stigma of this species and section. Also in Martelli's diagnosis (p. 369) he used the words, "stigma . . . pulvinatum." Consequently, the emendation in spelling made by Kanehira seems permissible under the International Code of Botanical Nomenclature. The section contains two species from Borneo.

Rykia (De Vriese) Kurz, Jour. Bot. Brit. and For. 5: 101–104, 1867 (as *Ryckia*); Asiat. Soc. Bengal, Jour. 38(2): 147, 1869. Genus *Rykia* De Vriese, Akad. Amsterdam, Verh. 2: 203, 1854, and in Hooker's Kew Jour. 6: 268, 1854. The alteration to *Ryckia* De Vriese emend. Balf. f., Linn. Soc. Bot., Jour. 17: 35, 48, 1878, and Martelli, Webbia 4(1): 96, 1913, was unjustified. As De Vriese stated, the genus was named in honor of Vice-Admiral J. C. Ryk. The Index Kewensis has already judged this change in spelling by Balfour as a mistake. As a new synonym, is included the section *Epiphytici* Martelli, Webbia 4(1): 96, 1913; Soc. Bot. Ital., Bul. 304, 1904. Its single species, *P. epiphyticus* Martelli, from Borneo, has all the morphological characteristics of the section *Rykia*. The fact that it was found growing perched upon another plant, is considered of no taxonomic significance. Type: *P. furcatus* Roxb. The section contains 74 species and ranges from Madagascar to Australia: Madagascar (3 species), India (13), Ceylon (2), Burma (5), Thailand (3), Malaya (9), Indochina (9), China (2), Philippines (5), East Indies (22), New Guinea (1), and Australia (1).

Rykiella Pic-Ser., Inst. Sci. Madagascar, Mém. B, 3: 155–158, 1951. Type: *P. macrophyllus* Martelli. This and the one other species occur in Madagascar.

SUBGENUS *Pandanus*

The use of the name *Pandanus* for this subgenus is required by the International Code of Botanical Nomenclature, since it contains the type section and the type species of the genus. It has long been known by the sectional name *Keura* (Forsk.) Kurz, Jour. Bot. Brit. and For. 5: 105, 1867. Type: section *Pandanus*. Drupes or phalanges all or nearly all several-celled.

Acanthostyla Martelli, Soc. Tosc. Sci. Nat., Atti, Proc. Verb. 42: 57, 1933; Inst. Sci. Mada-

gascar, Mém. sér. B, 3: 11, 122–126, 1951. Type: *P. spinifer* Warb. The section contains 13 species of Madagascar.

Australibrassia, sect. nov. Phalangiis pluricarpellosis lobatis in apice valde angustatis, apicibus carpellorum anguste deltoideis vel conicis exterioribus inflexis et valde asymmetricis.

Phalanges much narrowed towards the apex, and there lobed between the numerous carpels; apices of the carpels narrowly deltoid or narrowly conic, the outer ones inflexed and very asymmetric.

HOLOTYPUS: *P. conicus* St. John. Its description follows. Also in this section is the new *P. cochleatus* St. John.

Coronata Martelli, Univ. Calif. Publ. Bot. 12(10): 359, 1930. Lectotype: *P. corallinus* Martelli, l. c. 395, pl. 45, fig. 10–12, 1930. The lectotype is from Tongatabu, Tonga. The other species, *P. Whitmeeanus* Martelli, is known from Tongatabu, and from Savaii, Samoa; and *P. esculentus* Martelli is from Luzon in the Philippines.

Dauphinensia, sect. nov. Carpellis (1)-pluribus, phalangiis integris in apice late convexis, stigmatibus omnibus (vel omnibus unico centrale excepto) in margine circulo vel polygono apicale.

Carpels (1)-several; phalanges entire and with the apex wide convex; stigmas all (or all except the single central one) on the margin of an apical circle or polygon.

HOLOTYPUS: *P. dauphinensis* Martelli in Martelli and Pichi-Sermolli, Inst. Sci. Madagascar, Mém., sér. B, 3(1): 38–40, fig. 5, 1951.

The section contains six species, including: from east Africa, *P. Stuhlmanni*; from the Seychelles, *P. Hornei*; from Madagascar, the type, and *P. concretus*, and *P. reflexus*; and from Guam, *P. Kafu*.

Hombroonia (Gaud.) Warb., in Engler's Pflanzenreich IV, 9: 50, 1900; genus *Hombroonia* Gaud., Bot. Voy. La Bonite, Atlas, t. 27, fig. 17, (1843) [= 1841]. The name was published by Gaudichaud without a description, but the genus was monotypic, and it was illustrated by a figure with details, so the name was valid. Type: *Hombroonia edulis* Gaud., but the epithet is preoccupied in *Pandanus*, so the valid name is now *P. dubius* Spreng. The section contains 22 species, and it occurs from the Andaman Is. to

Samoa, as follows: Andaman Is. (1 species), Nicobar Is. (1), Malaya (1), Thailand (1), Philippines (2), Micronesia (3), Indonesia (1), New Guinea (8), Solomon Is. (2), New Caledonia (8), Isle of Pines (1), Loyalty Is. (2), New Hebrides (1), Australia (1), and Samoa (1).

Intraobtus, sect. nov. Stigma centripetalum anguste ellipticum in latere proximo praerupto carpelli truncati affixa; carpellis plurimis et adnatis; plantis masculis incognitis.

Stigma centripetal, narrowly elliptic, borne on the proximal steep inner side of the truncate carpel apex; carpels 7, adnate 6/7 way; staminate plant unknown.

HOLOTYPE: *Pandanus Parkinsonii* Martelli, *Webbia* 4(2): 417, t. 38, figs. 14–15, 1914. It occurs in the Bismarck Archipelago.

Lateriobtus, sect. nov. Carpellis plurimis adnatis, stigmatibus carpellorum aliorum ad carpellam marginalem dirigitis vel ad lineam marginalem carpellorum dirigitis. Ei carpelli obtuti quam altros breviori. Arbori masculi incogniti.

Carpels several, adnate, the stigma of all the others facing one marginal or the line of several marginal ones at the proximal edge. The focal carpels shorter than the others. Staminate trees unknown.

HOLOTYPE: *Pandanus biakensis* St. John, from Biak, Netherlands New Guinea, *H. St. John* 26,142, the description of which is appended at the end of this paper.

Mammillaris, sect. nov. Phalangibus in apice angustatis truncatis lobatisque, apicibus carpellis pluribus approximatis depresso conicis vel pyramidatis, columnis staminalis diffuse ramosis filamentis brevibus ferrentibus.

Phalanges narrowed to a truncate apex, lobed; apices of the several carpels depressed conic or pyramidal, crowded; staminal columns diffusely branched, bearing short filaments.

HOLOTYPE: *P. mammillaris* Martelli and Pic-Ser., *Inst. Sci. Madagascar*, Mém., sér. B, 3(1): 47–51, fig. 6, a–e, 1951.

The section contains 26 species, including: from west Africa, *P. thomensis*; from Madagascar, *P. bipyramidatus*, *P. diffusus*, *P. Karaka*, *P. mammillaris*, *P. Pervilleanus*, *P. sambiranensis*,

P. saxatilis, and *P. vanDamii*; from Reunion, *P. sylvestris*; from Mauritius, *P. drupaceus*, and *P. glaucocephalus*; from the Philippines, *P. akladus*, *P. biliranensis*, *P. camarinensis*, *P. luzonensis*, *P. Martellii*, *P. nobilis*, *P. panayensis*, *P. radicans*, *P. sibuyanensis*, *P. umbonatus*, and *P. urdatenensis*; from Palau, *P. Kanehirae*; from New Guinea, *P. Kaernbachii*; and from Australia, *P. Dammannii*.

Martillidendron Pic-Ser., *Inst. Sci. Madagascar*, Mém., sér. B, 3(1): 20, 1951. Type: *P. androcephalanthus* Martelli. The section contains three species from Madagascar.

Multispina Fagerlind, *Svensk Bot. Tidskr.* 34: 112–113, 1940. Type: *P. multifurcatus* Fagerlind, from Java, the only species.

Pandanus. Type: *P. odoratissimus* L. f., of Ceylon. A synonym is the sectional name *Keura* (Forsk.) Kurz, *Jour. Bot. Brit. and For.* 5: 105, 1867; *Asiat. Soc. Bengal, Jour.* 38(2): 147–150, 1869; genus *Keura* Forsk., *Fl. Aegypt.-Arab.* 95, 122, 172, 1775, a familiar and long-used name. Since this section contains the type species of the genus, it is now mandatory to use the same name as the name of this section, in compliance with Article 22 of the 1956 International Code of Botanical Nomenclature. At first sight Solms seems to typify *Pandanus* in his monograph (*Linnaea* 42: 3, 1878): "Typus *P. Kurzianii*," but he does the same for several other species. Those are the ones which he chose to use to provide group names for groups of species (sections of other taxonomists). These are not valid subgeneric or sectional names, being binomials for collective species. On p. 77 he says: "*P. odoratissimus* L. fil. Nomen delendum omnes fere tunc descriptas Pandani species amplectens." Thus Solms rejected the holotype of the monotypic genus on the basis of confusions and misdeterminations by subsequent botanists. His rejection is unjustified.

At the moment, the section contains 169 species. A few of these occur in Africa and in the Indian Ocean: east Africa (6 species), Comore Is. (1), Madagascar (1), Mauritius (1), Seychelles (2), Ceylon (1), India (2), Nicobar Is. (2), Andaman Is. (1), but the great bulk of the species which remain (151) occur in the tropical Pacific, from its western shore

to Hawaii, the Marquesas Is., and the Tuamotu Archipelago.

Stephanostigma Pic.-Ser., Inst. Sci. Madagascar, Mém. sér. B, 3: 112–113, 1951. Type: *P. analamazaotrensis* Martelli, the only species, a native of Madagascar.

Vinsonia Warb., in Engler's Pflanzenreich IV, 9: 44, 54–62, 1900. The genus *Vinsonia* Gaud., Bot. Voy. La Bonite, Atlas, pl. 17, 19, 23, and 31, (1843) [= 1841], contained 10 species when published by Gaudichaud. There were no descriptions to accompany the illustrations of either the species or the genus, so his specific and generic names were all invalid, though some of them were later validated by subsequent authors. Lectotype: *Vinsonia sylvestris* Gaud., Bot. Voy. La Bonite, Atlas, t. 17, figs. 16–17, (1843) [= 1841]. It is a synonym of *P. Barklyi* Balf. f. in Baker, Fl. Mauritius 397, 1877, a native of Mauritius. This is chosen as lectotype for section *Vinsonia* because among the 10 species published by Gaudichaud in his genus *Vinsonia*, 3 were of this affinity and they made a large element of his concept. *V. sylvestris* was well figured by Gaudichaud and is known to be native of Mauritius. Brongniart found a holotype of it in the Paris herbarium. Since the genus *Vinsonia* Gaud. was published without a generic description, but contained 10 species, the genus and species were invalid. In the original publication of *P. Barklyi*, Baker listed *V. sylvestris* Gaud. as a synonym, so the relation to this valid name is definite. Of the remaining seven species in Gaudichaud's genus *Vinsonia*, one, *V. drupaceus*, was based on fragmentary and dubious material. *V. lucidus* is obscure. *V. palustris* belongs to section *Pandanus*. The four species, *V. elegans*, *V. humilis*, *V. Pervilleana*, and *V. purpurascens*, belong to the section with the phalange narrowed to a small apex on which the numerous stigmas are crowded. This group is here described as a new section. It could bear the name *Vinsonia*, but the writer prefers to typify it by *P. mammillaris* Martelli and Pic.-Ser., a modern and better documented species. To preserve usage he prefers to typify *Vinsonia* by choosing one of the three species, *V. sylvestris*, *V. stephanocarpa*, and *V. utilis*, which Gaudichaud figured, that represent the section with

broad phalange, apex entire or shallowly lobed, and with the few stigmas remote. Of the three species, *V. sylvestris* Gaud. is chosen here as the lectotype for the section *Vinsonia*. The correct name for the lectotypic species is *Pandanus Barklyi* Balf. f. in Baker.

For the first time the section *Vinsonia* is here typified. At the same time it is restricted to 22 instead of 55 species. Of the remainder, *P. Eydouxia* is referred to the section *Pandanus*. Four species, and perhaps three doubtful ones, are assigned to the new section *Dauphinensia*. The distinctive characters of this were singled out by Martelli and Pichi-Sermolli, in Inst. Sci. Madagascar, Mém., sér. B, 3: 35–36, 1951, but they did not separate it as a section. Then, 26 species are grouped in the new section *Mammillarisia*. This is also a segregate from *Vinsonia* as formerly defined.

The generic name *Vinsonia* Gaud. was amended to *Vinçonia* by D'Alleizette, in his Explic. Descr. Pl. de l'Atlas 117, 1866. He failed to supply the missing descriptions, so his republication of the binomials is also invalid. His alteration of the generic name was orthographic, insignificant, and, under the rules of nomenclature, unnecessary. In concord with Vaughan and Wiehe (Linn. Soc. Bot., Jour. 55: 11, 1953) the section *Barklya* Warb. which was published in Engler's Pflanzenreich IV, 9: 44, 62, 1900, is reduced to synonymy. The 22 species of *Vinsonia* occur in: east Africa (2), Madagascar (1), Seychelles (1), Reunion (2), Rodriguez (1), Mauritius (11), Philippines (2), Kusaie (1), and Australia (1).

THE GENERIC NAME

Discussion is in order, concerning the publication of the generic name *Pandanus*, commonly attributed to Carolus Linnaeus the son (1781). It was first used as a generic name in 1743 by Rumphius in the fourth volume of his Herbarium Amboinense. There he described in great detail 11 species and illustrated 8 of them, each by a large, detailed drawing. He coined the generic name *Pandanus*, deriving it from the Malayan vernacular name of the trees, "pandan." Though no description of the genus was included, his treatment, the first under *Pandanus*, was by far the best for the next century. One

of Linnaeus' students, Olaf Stickman, was assigned the topic of the collation of the Herbarium Amboinense with the Species Plantarum of Linnaeus and the binomial system. All of the species of *Pandanus* published by Rumphius were given binomials in 1743, but Rumphius did not consistently follow the binomial system, and in any case, his book was pre-Linnaean, being previous to 1753 and so, by our International Code, illegitimate. Stickman in 1754 published his thesis under the title "Herbarium Amboinense." His thesis was concise and compact. In the left-hand column he quoted the names used by Rumphius, and in the corresponding right-hand column he entered the valid binomials that Linnaeus had published in 1753 for the same species, or for many others Stickman himself supplied the binomials. The genus *Pandanus* had not been given a name by Linnaeus the father, though Rheede van Draakestein had already illustrated some Indian species. In this part of his thesis Stickman left his right-hand column blank, thus failing to supply valid names for any of the species of *Pandanus*. He did, however, do something about the genus. Beside his listing of the first species of Rumphius, *Pandanus verus*, he referred to his own footnote (g). This is printed at the bottom of his page 17, "(g) Pandanus genus est nondum constitutum Monoeciae, Bromeliae forte affinis, fructu Ambrosiae." This refers to the extensive and well-illustrated treatment by Rumphius (1743), and to *Pandanus verus* Rumph., but Rumphius had not described his genus. Stickman wrote in his footnote (when translated): *Pandanus* is a genus not yet constituted, monoecious, with strong affinity to Bromelia, with a divine fruit. His sentence announces *Pandanus* as new, and gives three characters in his description. This satisfies the requirement that a new generic name must be accompanied by a description or a reference to one. Stickman failed to give legal names to any of the species but his publication of the genus is valid, as a genus may be published without species.

The names published by Stickman in his thesis of 1754 are commonly credited to Linnaeus, his professor. The title page of his publication includes the statement, "sub Praesidio D. D. Car. Linnaei," that is, written under the

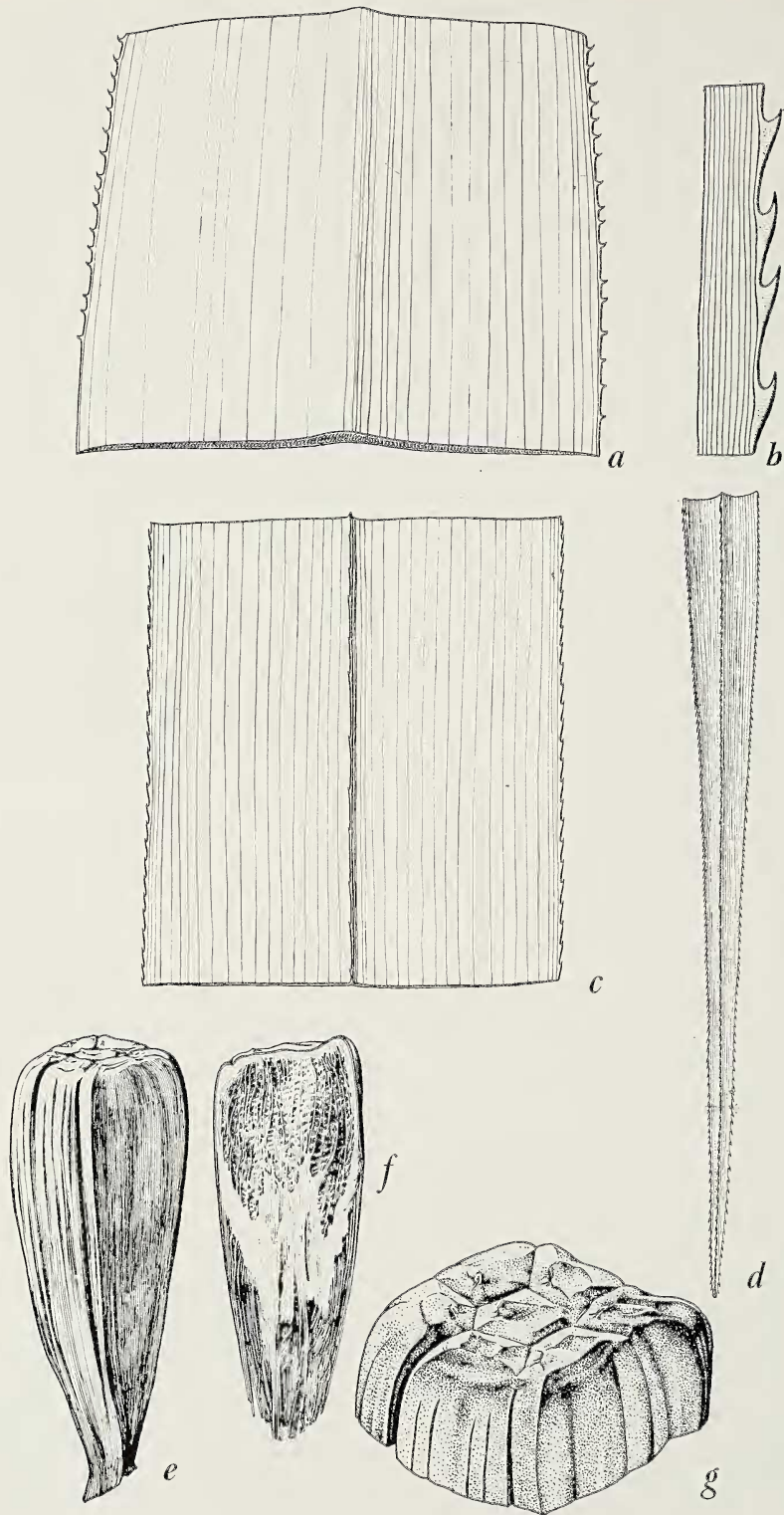
supervision of Prof. Linnaeus. It also states, "Proposuit Olavus Stickman, Smolandus, Upsaliae 1754," that is, this work is proposed by O. Stickman from Småland, at Upsala, in 1754. The thesis was printed, effectively published, and the author was Stickman. It also appeared in a second edition in the journal, *Amoenitates Academicæ*, edited by Prof. Linnaeus, to reprint for wider circulation the best of the theses written by his students. Stickman's Herbarium Amboinense appears there in volume 4, printed in 1759. This second edition is essentially identical with the first, except that the title page material is a brief extract, and except for a few misprints, as, for instance, in the footnote (g), "...Monoecia..." the final *e* being missing. Stickman is given as the author of the article, and nowhere does Linnaeus claim it as his own. The articles in the several volumes of the journal are by numerous different authors, and the few written by Linnaeus himself bear his name as author. The name of Linnaeus is on the title page of the volume, but that means merely that he was the editor of the volume, not the author of all the articles written by his students and reprinted in this journal series.

SECTION *Lateriobtutus*

Pandanus biakensis, sp. nov.

Fig. 1, a–g, 2–5

Arbor 16 m. alta 25 cm. diametro (8 m. ex basi), corona ampla, trunco magno cortice spinosa, foliis 3.65 m. longis 15 cm. latis ligulatis planis in apice longe diminuentibus in 10 cm. ex apice 10 mm. latis, marginibus basalibus cum aculeis 2.5–3 mm. longis 4–9 mm. distantibus salientibus vel adscendentibus, marginibus medialibus cum aculeis 1.5–2 mm. longis 4–6 mm. distantibus adpressi-adscendentibus, marginibus apicalibus cum aculeis 0.5–1 mm. longis 1–3 mm. distantibus adpressi-adscendentibus, midnervio in pagine inferiori in basi inermi, in medio cum aculeis 0.5–1 mm. longis 8–19 mm. distantibus, proxime apice ad eas marginales simulantibus, syncarpiis 42–51 cm. longis 25–29 cm. diametro 14–24.36 kilo ponderatis terminalibus solitariis adscendentibus ovoideis, phalangibus 160–212 et 10.5–12.6 cm. longis 4–5.5 cm. latis 3.5–5.5 cm. crassis oblanceo-oblongis luteis lateribus cum angulis longitudi-



nalibus numerosis projectis et sulcis alternatis vadosis, superficie sublucida et in sicca brunnea, parte supera $\frac{1}{3}$ libera, in sectio transverso quadrato vel pentagono, apice lata et vadositer concavo-truncata, carpelis 6–9 plerumque 7 apicibus truncatis vadositer concavisque eis centralibus tessellatis, sinibus centralibus subnullis, stigmatibus 1.5–2 mm. longis oblique ellipticibus et cum sinu basali centrali, carpela proxima breviora phalangis quisque focum est et stigmatibus alteris omnibus ad carpelam proximam singularem dirigitis, endocarpio paene submediali osseosi pallide brunneo marginibus 3–4 mm. latis, seminibus 14 mm. longis, 3 mm. diametro anguste ellipsoideis, mesocarpio apicali grandi $\frac{1}{3}$ parte phalangis repletenti et indivisi multifibrosi et brunneo-medullosi membranosus, mesocarpio basali fibroso et carnosus.

Tree 16 m. tall, 25 cm. in diameter at the widest part (8 m. up the trunk), with ample crown; the bark slightly muriculate; prop roots 4–6 m. long, 10 cm. in diameter, spiny; leaves 3.65 m. long, 15 cm. wide, ligulate, plane, the apex slender and long tapering, at 10 cm. below the apex only 10 mm. wide; the margins near the base with salient or ascending stout prickles 2.5–3 mm. long, 4–9 mm. apart; near the middle the teeth 1.5–2 mm. long, 4–6 mm. apart, appressed ascending; near the apex the teeth 0.5–1 mm. long, 1–3 mm. apart, appressed ascending; the midrib below unarmed at base, at the middle with ascending prickles 0.5–1 mm. long, 8–19 mm. apart, but near the apex like those of the adjacent margins; fruiting heads terminal, single, ascending, ovoid, 42–51 cm. long, 25–29 cm. in diameter, weighing 14–24.36 kilos; phalanges 160–212 in number, 10.5–12.6 cm. long, 4–5.5 cm. wide, 3.5–5.5 cm. thick, oblance-oblong, yellow, the sides with numerous sharp, longitudinal ridges and alternating shallow furrows, the surface sublucid, when dried brown, upper $\frac{1}{3}$ part free, in cross-section quadrate or pentagonal, the broad apex shallow concave-truncate; carpels 6–9, mostly 7, their apices truncate and shallowly concave, the central ones tessellate, their sinuses nearly lacking; stigmas 1.5–2 mm. long, oblique, elliptic, with



FIG. 2. *Pandanus biakensis*, holotype, in situ.

a basal central cleft, the proximal carpel of each phalange the shorter and with the stigma facing distally, and all the other carpels oriented to and facing this focus carpel; endocarp slightly submedian, bony, pale brown, its margin 3–4 mm. thick; seeds 14 mm. long, 3 mm. in diameter, narrowly ellipsoid; apical mesocarp one large undivided area occupying $\frac{1}{3}$ of the phalange, traversed by numerous fibers and with many membranous, brown cross-partitions, enclosed by a marginal prolongation of the endocarp; lower mesocarp fibrous and fleshy.

NOM. VERN.: "andim" (Biak); "diem" (Kurudu). Informant: Thimotaeus Samber of Biak.

HOLOTYPE: Netherlands Nieuw Guinea, Biak I., 7 km. n. of Bosnek, in forest of bamboo, *Cyathea*, and *Ervatamia*, 60 m. alt., trees planted in forest edge, said to have been imported from Japen Is., 8 Dec. 1957, *H. St. John* 26,142 (BISH).

FIG. 1. *Pandanus biakensis*, from the holotype. *a*, Leaf base underside, $\times 1$; *b*, leaf base margin, $\times 4$; *c*, leaf middle underside, $\times 1$; *d*, leaf tip underside, $\times 1$; *e*, phalange, lateral view, $\times 1$; *f*, phalange, median longitudinal section, $\times 1$; *g*, phalange apex, $\times 2$.

DISCUSSION: The new section *Lateriobtus* will receive several other species, but it is here based on a single species. It is distinctive in its shorter single or single line of proximal carpels which are the focus of the stigmas of all the other carpels of each large, oblong phalange. In the related section *Pandanus*, the stigmas are centripetal, focusing on the one or more central carpels, and the phalanges tend to be symmetrical.

SECTION *Australibrassia*

Pandanus conicus sp. nov.

Fig. 6

DIAGNOSIS HOLOTYPE: Arbor 10 m. alta laxa ramosa, trunco cum spinis adscendentibus armato, radicibus inclinatis aereis 40–50 cm. longis gracilibus multis, foliis 300–325 cm. longis in base 4.5 cm. latis ligulatis subcoriaceis ad basem inermibus supra glaucis in sectio transversa late M-formato sed 10 cm. ex base cum aculeis 1–2 mm. longis 5–10 mm. distantibus crassiter subulatis adscendentibus pallidis sed apicibus ru-

bris midnervio inerme, in sectio mediale marginibus cum aculeis 0.6–1.5 mm. longis 3–10 mm. distantibus subulatis subadpressis pallidis cum apicibus rubris midnervio infra cum aculeis paucis minutis remotis, apice gracile et in sectio 10 cm. ex apice solum 1.2 mm. lato marginibus cum serris 0.5 mm. longis 2–3 mm. distantibus subulatis pallidis cum apicibus rubris midnervio cum dentibus simulantibus 0.5–0.7 mm. longis, syncarpiis solitariis pendentibus 24 cm. longis 16 cm. diametro elliptico-ovoideis, phalangiis ca. 44 et 6–6.2 cm. longis 4–4.4 cm. latis 3.4–3.8 cm. crassis pyriformibus compressis 4–6-angulatis lateribus laevibus curvatis sublucidis suturis lateralibus nullis parte dimidia supera libera apice 1–2.5 cm. lato truncato, carpellis 12–14, apicibus liberis 4–6 mm. longis anguste pyramidalibus acute angulosis eis centralibus erectis eis exterioribus cum capite erecto vel paene divergente vel inflexo, sinibus apicalis centralibus 4–6 mm. profundis, stigmatibus 1–2 mm. longis irregulariter ovalibus vel rhombicis obscure brunneis firmis lucidis apicalibus et plusminusve in lateribus ambis interioribus ex-



FIG. 3. *Pandanus biakensis*, holotype, spread of spiny prop roots at base. The tree was climbed on steps cut in a spiny prop root, seen to the right of center.



FIG. 4. *Pandanus biakensis*, holotype, syncarp, lateral and median views; also a view of the lower side and base of a leaf.

terioribusque prolapsis in latere proximo sulcatis supra sulcum proximum carpelli, endocarpio paene supramediale osseoso grande obscure mahogani-brunneo marginibus 3–5 mm. crassis, seminibus 10–12 mm. longis 3–4 mm. diametro ellipsoideis, mesocarpio apicale caverno unico fibroso meduloso formante, mesocarpio basale fibroso et carnosio.

DIAGNOSIS OF HOLOTYPE: Tree about 10 m. tall, "armed with stout, upturned prickles," crown open; prop roots 40–50 cm. long, slender; leaves 2.7–3.25 m. $\times$ 4.4 cm., "glaucous above at the base," ligulate but very gradually tapering to an elongate subulate tip which 10 cm. down from the tip is only 1 mm. wide; blade firm, subcoriaceous, the very base unarmed, not dilated, but near the base (beginning 10 cm. up) the margins with prickles 1.5–2 mm. long, 5–9 mm. apart, stout subulate, the tip pale, the base brownish, ascending at 45°, the nearby midrib smooth; at the middle the margins with teeth 0.7–1 mm. long, 2–7 mm. apart, ascending at 30°, stramineous or tipped with brown, the

nearby midrib below with a few remote, very minute, appressed ascending spines; near the tip the margins and midrib below serrate with ascending spines 0.3 mm. long, 2–4 mm. apart; peduncle at least 14 cm. long, leafy bracted; fruiting syncarp about 24 cm. long, 16 cm. in diameter, elliptic-ovoid, pendent, bearing about 45 phalanges; phalanges 6–6.2 cm. long, 4–4.5 cm. wide, 2.8–3.5 cm. thick, slightly compressed, sharply 4–5-angled, each side between the angles a curving plane, somewhat shining, when dried brown, upper $\frac{1}{2}$ part free, rounded, or just below the carpel apices slightly concave, the apex truncate (or very slightly convex); carpels 12–14 on lateral and principal phalanges, their carpel apices pyramidal, forming a flat top about 2.5 cm. wide; the outer ones strongly curving inflexed, the inner ones slender pyramidal, almost symmetrical, with numerous prominent angles; stigmas centripetal, running from the apex down the proximal side, those of marginal carpels 2 mm. long, narrowly elliptic, creased, those of central carpels 2–3 mm. long, narrowly elliptic to elliptic, dark, firm, creased

throughout; endocarp slightly above the middle, bony, massive, dark mahogany brown, the lateral margins 4–7 mm. thick; seeds 12–14 mm. long, 4–5 mm. in diameter, ellipsoid; apical mesocarp with one large cavern with pithy pale membranes and traversed by strong fibers; lower mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, Leo Creek, Upper Nesbit River, Cape York Peninsula, frequent and more or less gregarious, in rain forest, 420 m. alt., Aug. 16, 1948, *L. J. Brass* 19,866 (Brisbane).

DISCUSSION: *P. conicus* is allocated to a new section. It is related to *P. cochleatus* St. John, here described. A statement of the contrasting differences is to be found in the treatment of that species.

The new specific epithet is from the Latin *conicus*, conical, in allusion to the shape of the projecting carpel tips. The sectional name is coined from Australia, plus Brass, the name of the collector, in tribute to the numerous and excellent collections of *Pandanus* and other genera that he has made.

In describing the lobed tips of phalanges composed of several partly united carpels, it is important to describe intelligibly the kind of lobing. Too many species have been described with phrases like, shallowly lobed, deeply lobed, with narrow sinuses, or with shallow sinuses, though all of these are almost meaningless. A complication is that often the sinuses gradually

deepen as they approach the outer edges of the summit of the phalange. For use in this revision, the writer had adopted the method of measuring the depth of the apical central sinuses. The distance is measured from the bottom of the sinus up to a horizontal line even with the bottom of the stigma of the nearest carpel. A measurement could be taken to the top of the stigma, and this would also be usable. However, the stigmas are the softest part of a dried phalange, are exposed, and in a large per cent of the museum specimens are more or less eroded. Hence the measurement to the base is preferred. This measurement has been tested on scores of species and found to provide a character and one usually of diagnostic value.

Pandanus cochleatus sp. nov.

Fig. 7

DIAGNOSIS HOLOTYPI: Arbor 4–5 m. alta laxa ramosa, radicibus aereis nullis, foliis 1–1.2 m. longis 3.2 cm. latis subcoriaceis ligulatis nervis secundariis fortibus nullis paene in apice subulato diminuentibus supra perglaucis infra ad basim perglaucis in base integris sed ad 10 cm. ex base dentibus 1.3–2 mm. longis 2–6 mm. distantibus subulatis stramineis sed in apice brunneis, midnervio inerme, in sectio mediali marginibus cum dentibus 0.5–1 mm. longis 1–2.5 mm. distantibus subulatis adscendenti-adpressis tum midnervio cum dentibus simulantibus 0.3–0.5 mm. longis 2.5–8 mm. distantibus, ad apicem marginibus cum serris 0.3–0.4 mm. longis 1–2 mm. distantibus adscendentibus sed in midnervio serris 2–8 mm. distantibus, syncarpiis ca. 13 × 11 cm. solitariis pendentibus ovoideo-globosis, phalangiis multis 4.3–4.5 cm. longis 3.3–4.2 cm. latis 2.4–3.3 cm. crassis (sed in phalangio duplicato 4.1 × 5.7 × 3.3 cm.) pyriformibus compressis apice truncato dimidio tam lato quam phalangio 4–6-angulosis suturis lateralibus nullis lateribus laevibus curvatis in sicco pallide brunneis sublucidis parte 3/5 supera libera, carpellis 12–16 (28 in duplicato) apicibus 4.5–7 mm. longis in summo phalangis truncato centrale aggregatis anguste compresso-pyramidalibus eis marginalis arcuatis incurvatis acute angulosis eis centralibus symmetricis et plerumque angustioribus, sinibus apicalis centralibus 4–6 mm. profundis, stigmatibus 1–1.5 mm. longis centri-

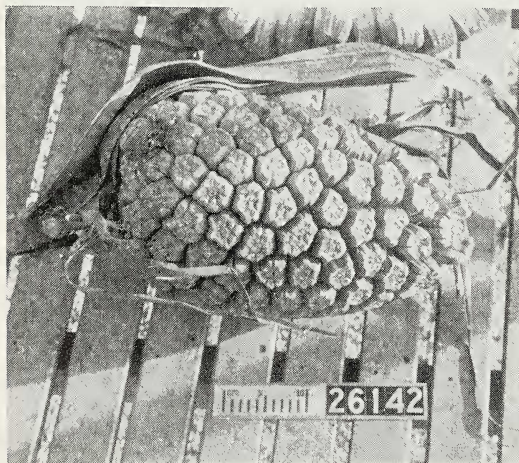


FIG. 5. *Pandanus biakensis*, holotype, lateral view of syncarp.

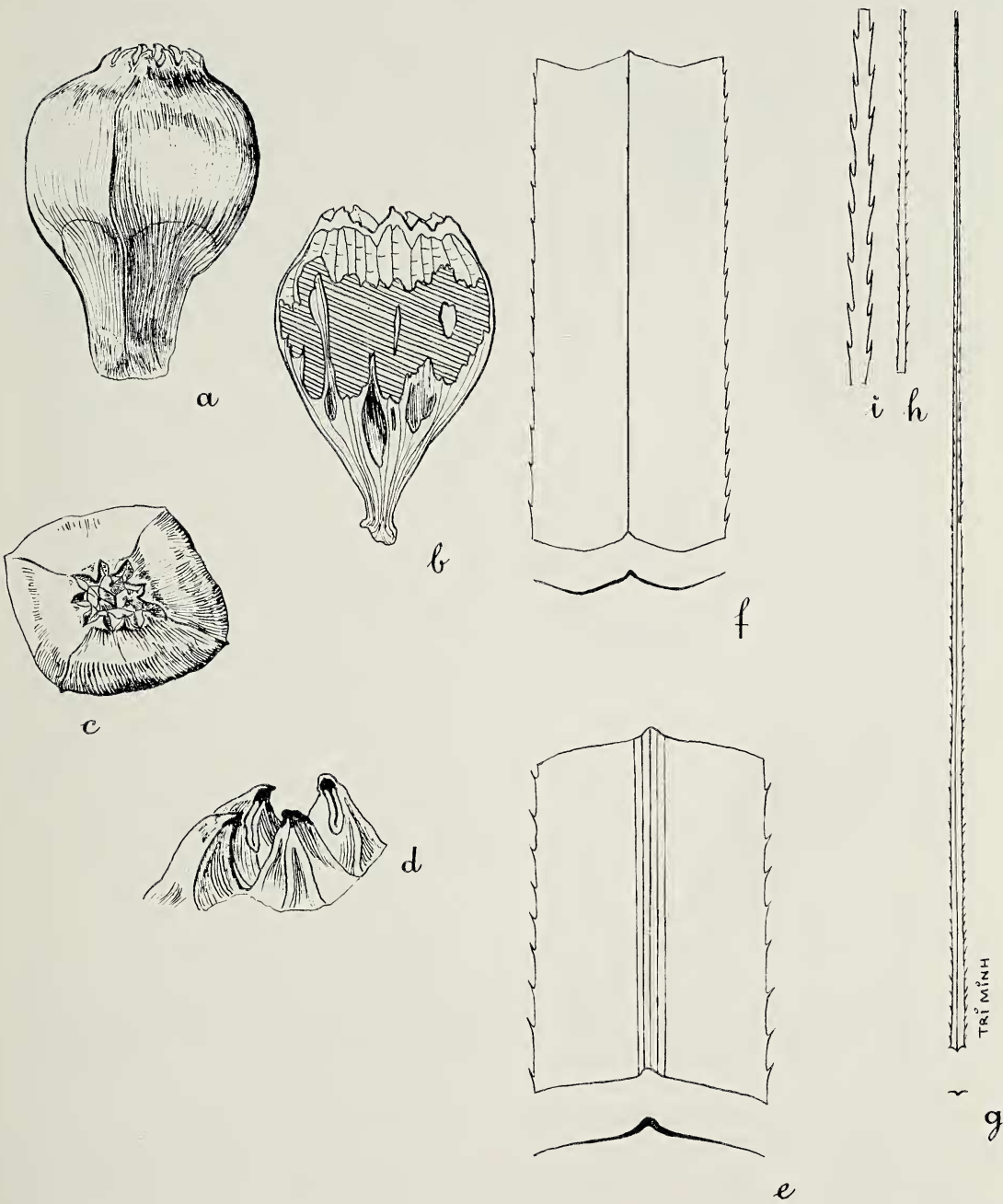


FIG. 6. *Pandanus conicus*, holotype. *a*, Phalange, lateral view, $\times 1$; *b*, phalange, longitudinal section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, carpel apices and stigmas, an inner one at lower right, and three outer ones, oblique view, $\times 4$; *e*, leaf base, lower side, $\times 1$; *f*, leaf middle, lower side, $\times 1$; *g*, leaf tip, lower side, $\times 1$; *h*, leaf tip, lateral view, $\times 1$; *i*, leaf tip, lateral view, $\times 4$.

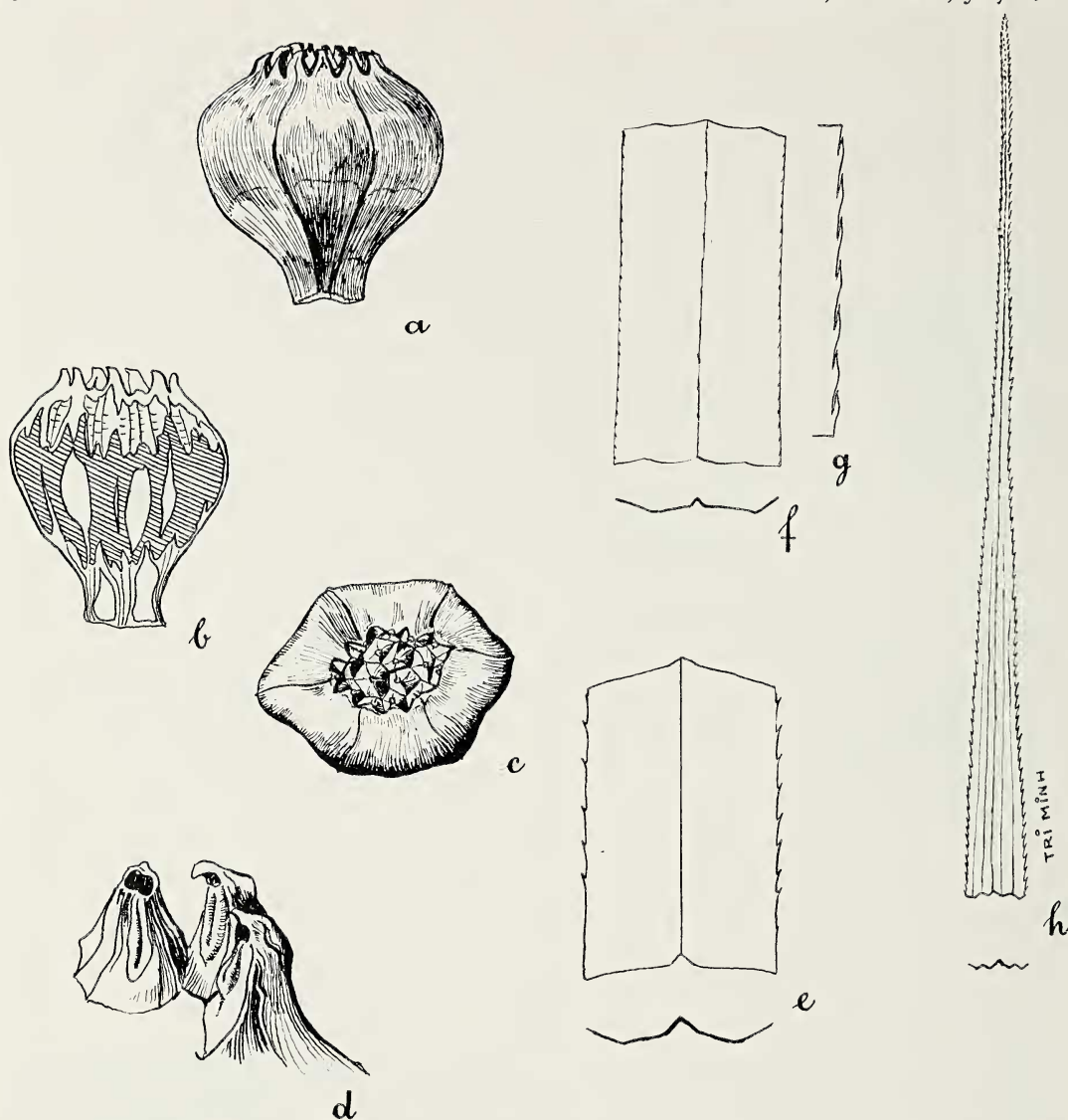


FIG. 7. *Pandanus cochleatus*, from holotype. *a*, Phalange, lateral view, $\times 1$; *b*, phalange, longitudinal section, $\times 1$; *c*, phalange, apical view, $\times 1$; *d*, carpel apices and stigmas, an inner one at left, and two outer ones, oblique view, $\times 4$; *e*, leaf base, lower side, $\times 1$; *f*, leaf middle, lower side, $\times 1$; *g*, leaf margin at middle, $\times 4$; *h*, leaf apex, lower side, $\times 1$.

petalibus ovalibus vel suborbicularibus sulcatis nigris apicalibus vel subapicalibus in latere proximo apicis affixis et infra apice pallido cartilagineo cochleato, apice proximo carpellis infra stigmatibus sulco pallido prominente ferrento, endocarpio mediale osseoso grande mahoganibrunneo lateribus 3–5 mm. crassis, seminibus 12–14 mm. longis 3–5 mm. diametro ellipsoideis, mesocarpio apicalis cum cavernis multis angustis medullosis et cum fibris validibus, mes-

ocarpio basalis fibroso et carnosio.

DIAGNOSIS OF HOLOTYPE: "Tree, 4–5 m. tall; stem branched into a tiered, open crown; prop roots absent; leaves 1–1.2 m. long," 3.2 cm. wide, subcoriaceous, ligulate, with only one strong nerve, gradually long tapering to a subulate apex, this only 3 mm. wide at 10 cm. from the apex, "above very glaucous and below very glaucous at base," at base the margins entire for 6–10 cm., then with teeth 1.3–2 mm. long,

2–6 mm. apart, ascending at 45° , subulate, stramineous but brown-tipped, the basal midrib unarmed; the margins in the midsection with teeth 0.5–1 mm. long, 1–2.5 mm. apart, subulate, ascending, closely appressed, of the same color, the nearby midrib with similar teeth only 0.3–0.5 mm. long, 2.5–8 mm. apart; near the apex the margins with subulate-tipped serrations 0.3–0.4 mm. long, 1–2 mm. apart, ascending, of the same color, the adjacent midrib below with similar teeth 2–8 mm. apart; syncarps about 13×11 cm., solitary, pendent, ovoid-globose; phalanges numerous, 4.3–4.5 cm. long, 3.3–4.2 cm. wide, 2.4–3.3 cm. thick (but in a doubled one $4.1 \times 5.7 \times 3.3$ cm.), pyriform, laterally compressed, the truncate apex about $\frac{1}{2}$ as broad as the phalange, 4–6-angled, lateral sutures none, the sides smooth, curved surfaces, when dried light brown, somewhat shiny, upper $\frac{3}{5}$ free; carpels 12–16 (28 in a double), crowded in a flat central apex, the tips 4.5–7 mm. long, narrowly compressed pyramidal, the marginal ones arcuate, incurving, sharply angled, the inner ones symmetric and mostly narrower, the central apical sinuses 4–6 mm. deep; stigmas 1–1.5 mm. long, centripetal, oval to suborbicular, creased, black, apical or subapical, flush on the inner side of the conical apex below an overhanging, cartilaginous, pale, cochleate tip; below the stigma the proximal crease on the carpel is prominent and with pale liplike edges; endocarp median, bony, extensive, mahogany brown, the lateral margins 3–5 mm. thick; seeds 12–14 mm. long, 3–5 mm. in diameter, ellipsoid; apical mesocarp with numerous narrow caverns traversed by strong fibers and pale medullary partitions; basal mesocarp fibrous and fleshy.

HOLOTYPE: Australia, Queensland, Cape York Peninsula, Brown's Creek, Pascoe River, frequent in brushy forest on islands in flood bed of creek, 60 m. alt., July 13, 1948, *L. J. Brass* 19,540 (BRISBANE).

DISCUSSION: *P. cochleatus* is a member of the section *Australibrassia* which is a segregate from the section *Vinsonia*. Its closest relative is the Australian *P. conicus* St. John, from which it differs by having the prop roots absent; leaves 1–1.2 m. long, 3.2 cm. wide, at midsection the marginal teeth 1–2.5 mm. apart; syncarp 13×11 cm., ovoid-globose; phalanges 4.3–4.5 cm.

long, the upper $\frac{3}{5}$ free; stigmas apical or subapical, flush on proximal side of carpel apex, under an overhanging cartilaginous cochleate tip; and the endocarp median. On the other hand, *P. conicus* has prop roots 40–50 cm. long, slender, numerous; leaves 3–3.2 m. long, 4.5 cm. wide, at midsection the marginal teeth 3–10 mm. apart; syncarp 24×16 cm., elliptic-ovoid; phalanges 6–6.2 cm. long, the upper $\frac{1}{2}$ free; stigmas apical and overlapping on both proximal and distal sides of carpel apex; and the endocarp suprmedian.

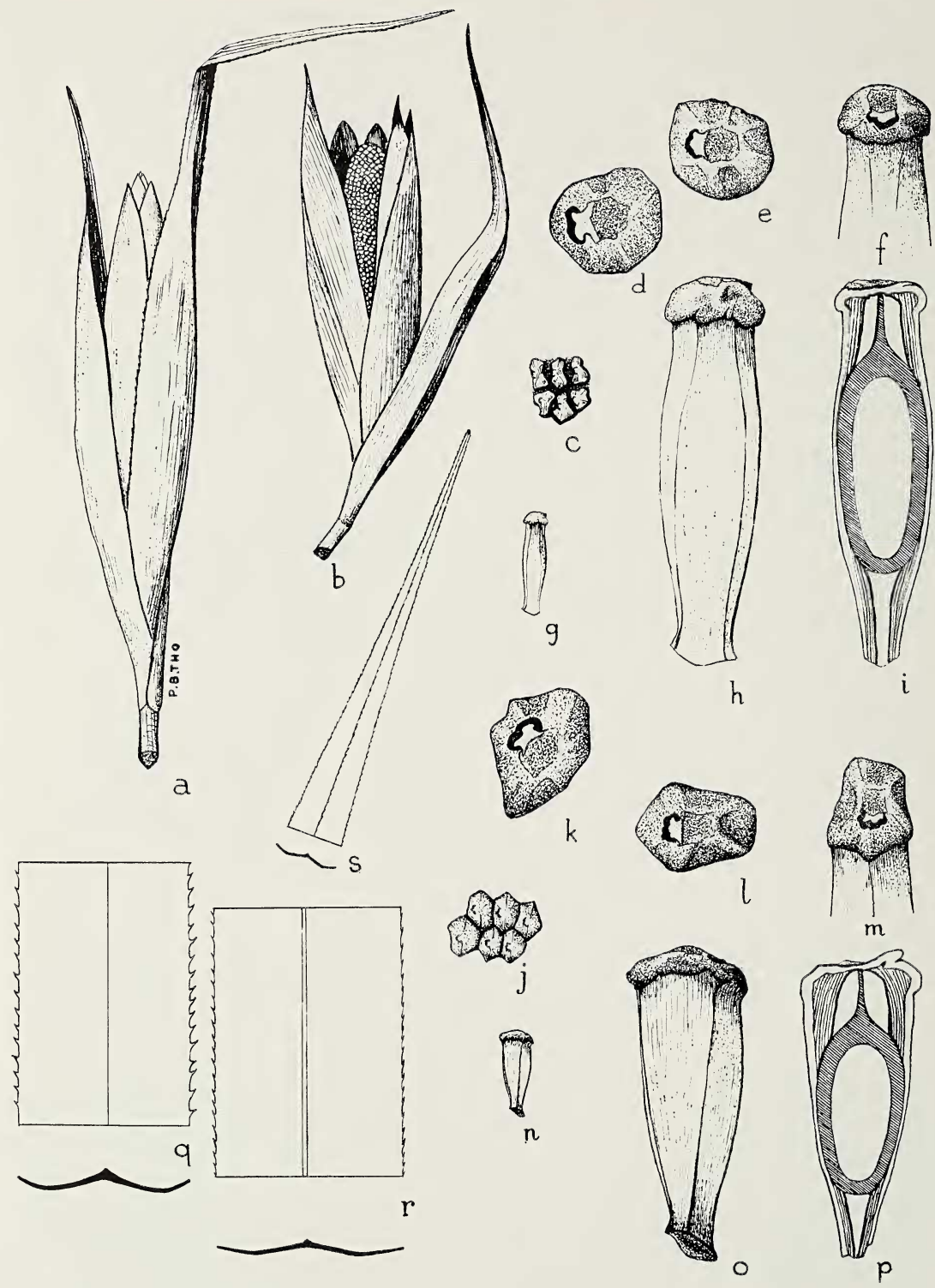
The new epithet is from the Latin *cochlea*, sea shell or snail shell, an allusion to the shell-like carpel apex that overhangs the stigma.

SECTION *Maysops*

Pandanus Zea sp. nov.

Fig. 8

DIAGNOSIS HOLOTYPE: Arbor 10–12 m. alta ramosa cum radicibus fulturosis longis trunco radicibusque cum aculeis parvis adscendentibus armatis, foliis 1.5 m. longis 4.2 cm. latis coriaceis ligulatis in sectio M-formatis in apice subacuto longiter diminuentibus et in puncto 10 cm. ex apice 14 mm. latis infra paucis glaucis ad basim marginibus cum subulato-serris 1.5–2 mm. longis 2–4 mm. distantibus in 45° adscendentibus in apicibus brunneis midnervio exarmato, in regio mediale marginibus cum subulato-serris 0.8–1 mm. longis 2–5 mm. distantibus in 25° adscendentibus in apicibus brunneis midnervio exarmato, ad apicem marginibus cum subulato-serris 0.3–1 mm. longis 0.5–2 mm. distantibus, midnervio cum serris simulantibus sed distantioribus, pedunculis foliosis, syncarpiis solitariis subpendentibus cum bracteis numerosis aurantiaco-luteis amplectentibus et fructu *Zea Mays* simulantibus, corpore ca. 33×5.5 cm. apice acuminato viride 20 cm. longo in sectio mediale cum dentibus aciculatis salientibus 1–1.5 mm. longis, bracteis interioribus coloratis navicularibus ellipticis 35 cm. longis 9.5 cm. latis in tertia infera cum dentibus aciculatis salientibus 1–2 mm. longis 1–2 mm. distantibus, in sectio mediale exarmatis, in tertia supera marginibus et nervo mediale cum dentibus subulatis 0.6–0.9 mm. longis 0.5–1 mm. distantibus adpresse adscendentibus, syncarpiis 20–22 cm. longis 7–7.5 cm. diametro cylindricis obtusis



luteis, drupis biformatis eis terminalibus 14–17 mm. longis 5.5–9 mm. latis 5–8 mm. crassis oblanceoloideis pileo 1–2 mm. alto, stigmatibus 1–1.5 mm. latis exterminibus lunatis brunneis in apice syncarpi dirigitis horizontales infra sed exserto ex projectione cartilagineo luteo flabellato sed plerumque 1-2-lobato, endocarpio centrale 9 mm. longo lateribus 1 mm. latis pallidis duris cartilagineis sed facilius in fibris transversis fractis, drupis lateralibus 20–21 mm. longis 4–5 mm. latis 3.5–4.5 mm. crassis corpore oblongo-fusiforme, pileo 2–3 mm. alto depresso convexo marginibus sinuatis, mesocarpio apicale caverno unico formato, mesocarpio basale in centro cavernoso in lateribus fibrosis.

DESCRIPTION OF ALL SPECIMENS EXAMINED: Tree 7–12 m. tall, branched into an open crown, supported on prop roots about 1 m. long, the stem and roots "armed with small, sharp, upturned prickles"; leaves 1.5–1.72 m. long, 4.1–4.2 cm. wide, coriaceous, M-shaped in cross-section, ligulate, long tapering to subacute tip, and 10 cm. back from tip only 14 mm. wide, the lower side somewhat glaucous, almost to the base the margins with subulate-tipped serrations 1.5–2 mm. long, 2–4 mm. apart, ascending at 45°, tipped with brownish, the midrib unarmed, at the middle the margins subulate-serrate, the teeth 0.8–1 mm. long, 2–5 mm. apart, ascending at 25°, brownish tipped, the midrib unarmed, near the tip the margins subulate-serrate, the teeth 0.3–1 mm. long, 0.5–2 mm. apart, the midrib below with similar but more remote teeth; peduncles leafy bracted; syncarps solitary, subpendent, surrounded and completely enveloped by numerous orange-yellow bracts, and strongly resembling an ear of corn in its husk, the two outer bracts with the body about 33 × 5.5 cm., then prolonged into an acuminate, green tip about 20 cm. long which resembles the leaves, at midsection the salient, acicular teeth 1–1.5 mm. long; inner colored bracts boat-shaped, elliptic, 35 cm. long, 9.5 cm. wide, margins of the lower third with acicular, salient teeth 1–2 mm. long, 1–2 mm. apart, the middle

unarmed, the upper third with the margins and midrib with teeth 0.6–0.9 mm. long, 0.5–1 mm. apart, subulate, appressed ascending; syncarps 20–22 cm. long, 7–7.5 cm. in diameter, cylindric, obtuse, yellow; drupes of two shapes, the terminal ones 14–17 mm. long, 5.5–9 mm. wide, 5–8 mm. thick, oblanceoloid, ending in the low convex pileus 1–3 mm. high; stigma 1–2 mm. wide, on pileus but off center, lunate, brown, facing apex of syncarp and at right angles to drupe, projecting from under a cartilaginous, yellowish visor, fan-shaped but usually with 1–3 rounded lobes; endocarp central, 9–10 mm. long, the sides 1–1.5 mm. thick, pale, hard, cartilaginous but easily broken into transverse fibers; lateral drupes 20–21 mm. long, 4–5 mm. wide, 3.5–4.5 mm. thick, the body oblong fusiform, the pileus 2–3 mm. high, low convex, its lower margin scalloped; apical mesocarp a single cavern; basal mesocarp cavernous in the center, fibrous on the sides.

HOLOTYPE: Australia, Queensland, Cape York Peninsula, Iron Range, common in hollows and gullies in rain forest, 20 m. alt., June 22, 1948, *L. J. Brass* 19,293 (BRI).

SPECIMENS EXAMINED: Australia, Queensland, Cape York Peninsula, Leo Creek, Upper Nesbit River, frequent in a ravine in rain forest, 420 m. alt., Aug. 16, 1948, *L. J. Brass* 19,869 (BRI).

DISCUSSION: The closest relative is *P. amboinensis* Warb. of the East Indies which has the leaf margin near the base with divergent spines, the midrib spiny near the base and at the middle; pileus apex truncate; stigma under a projecting entire tooth; and the endocarp suprmedian. On the contrary, *P. Zea* has the leaf margin near the base with ascending spines, the midrib unarmed near base and middle; syncarp concealed; pileus apex convex; stigma under a projecting 2-3-lobed tooth; and the endocarp inframedian.

The specific epithet is the generic name *Zea* of the cultivated corn or maize, chosen because of the similarity of the fruits.

FIG. 8. *Pandanus Zea*, holotype. *a*, Younger syncarp, × 2/7; *b*, mature syncarp, × 2/7; *c*, lateral drupes from above, × 1; *d,e*, lateral drupe from above, × 4; *f*, lateral drupe from side, × 4; *g*, lateral drupe, side view, × 1; *h*, lateral drupe, side view, × 4; *i*, lateral drupe, longitudinal section, × 4; *j*, apical drupes, from above, × 1; *k,l*, apical drupe from above, × 4; *m*, apical drupe, oblique lateral view, × 4; *n*, apical drupe, lateral view, × 1; *o*, apical drupe, lateral view, × 4; *p*, apical drupe, longitudinal section, × 4; *q*, leaf base, lower side, × 1; *r*, leaf middle, lower side, × 1; *s*, leaf apex, lower side, × 1.